ATTACHMENT II-1-5

MACROENCAPSULATION PLAN

1. PURPOSE AND SCOPE.

This attachment outlines the requirements for macroencapsulation ("MACRO") at the Permittee's Facility. The requirements in this plan apply to MACRO operations.

2. DEFINITIONS.

a. MACRO is defined as follows:

i. MACRO for Radioactive Lead Solids (LDPE MACRO or MACRO Vault): MACRO with surface coating materials such as polymeric organics (e.g. resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. MACRO for radioactive lead solids specifically does not include any material that would be classified as a tank or container.

ii. MACRO for Hazardous Debris (LDPE MACRO, MACRO Capsule, or MACRO Vault): Macroencapsulation with surface coating materials such as polymeric organics (e.g. resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media.

b. LDPE MACRO Form (MACRO Form) is defined as hazardous debris, radioactive lead solids waste, or both, that has been macroencapsulated by low-density polyethylene. Wastes that meet MACRO criteria can be managed as a container.

c. MACRO Capsule is defined as hazardous debris that has been macroencapsulated in a closed container.

d. MACRO Vault is defined as hazardous debris, radioactive lead solids waste, or both that has been macroencapsulated by placing in an engineered vault, filling void spaces, and applying surface coating materials such as polymeric organics (e.g. resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. MACRO Vaults may be constructed directly in the Mixed Waste Landfill Cell in accordance with the applicable requirements of this Attachment.

e. Engineered vault is a term applicable to the approval and construction of a MACRO Vault. An engineered vault has been evaluated and approved by the

Executive Secretary in accordance with the applicable requirements of this Attachment.

f. Mold is defined as a container in which LDPE MACRO is performed.

g. Container for the purpose of this plan shall be defined as any portable device in which a material is stored, transported, treated, disposed of, or otherwise handled. This includes containers that have a solid floor and all sides with a lip a minimum of 1.5 inches.

h. Spot welding is applicable to MACRO Forms and is defined as heating the surface of a cooled MACRO Form for working the heated area. Spot welding shall include the application of molten polyethylene to the heated area. When molten polyethylene is applied, the waste form shall also be heated to ensure a fusion of the LDPE.

i. Spot heating is applicable to MACRO Forms and is defined as heating the surface of a cooled LDPE waste form for working the heated area without adding LDPE.

j. Cold jointing is applicable to MACRO Forms and is defined as applying molten LDPE to cooled LDPE in an attempt to achieve MACRO without first preparing the surface of the cooled LDPE by heating.

k. Repeat MACRO is defined as completely macroencapsulating a waste or MACRO Form that has previously undergone MACRO operations.

l. Secured is a term applicable to closure of MACRO Capsules. Secured is defined as meeting the criteria provided in Module III for a closed container, with the additional requirement that the closure mechanism be capable of withstanding the effects of normal conditions of storage and transport without any deterioration in the effectiveness of the closure mechanism or in the effectiveness of the MACRO Capsule's ability to meet the acceptance criteria.

m. Sealed is a term applicable to completion of MACRO Vaults. Sealed is defined as meeting the criteria provided in Module III for a closed container, with the additional requirement that the sealing material(s) be selected and applied so that precipitation or leachate is prevented from entering the MACRO Vault.

n. Disposal shall be defined as final approval of the waste lift in accordance with the CQA/QC Manual.

3. ACCEPTANCE CRITERIA.

Waste managed as macroencapsulated waste shall meet the definition of MACRO. The following requirements apply to the specific elements of the MACRO definition:

a. "Surface coating materials"

i. Polymeric organic encapsulating materials (e.g., resins and plastics) shall be used, provided that they are applied to the surface of the material being macroencapsulated.

ii. Materials that are not applied as coatings such as plastic "wraps" are not acceptable as surface coating materials.

b. "Jacket of Inert Inorganic Materials"

i. Encapsulating materials shall be composed of metal or inorganic materials.

ii. The encapsulating jacket shall be chemically and physically stable and chemically inert with respect to the wastes and other materials it may contact within a Mixed Waste Landfill Cell.

iii. Metals or alloys that would be determined by DOT methods to be pyrophoric shall not be used.

iv. Reactive metals or alloys such as those of Group IA or IIA of the periodic table of the elements shall not be used.

v. As a macroencapsulant, metal jackets shall be in direct surface contact with the waste through lamination, welding, a pozzolanic materials pour, a ceramic materials pour, and/or a molten metals pour.

vi. Other inert inorganic materials may be used as jackets. Such inorganic materials shall not be carbon-based compounds or substances.

vii. MACRO using non-metal inert inorganic materials may be held by a mold container only if the container is also not the MACRO jacket. Such non-metal inert inorganic MACRO material:

A. shall be largely monolithic
B. shall not be susceptible to liquid penetration
C. shall not be of a crumbly consistency or susceptible to deterioration such as crumbling, spalling, flaking or cracking.

c. "Substantially Reduce Surface Exposure to Potential Leaching Media"

Note: *Corrective action shall be taken for any macroencapsulated waste that does not meet these acceptance criteria.*

i. Each object subject to the standard of MACRO shall be macroencapsulated meaning encapsulated within the MACRO Form, MACRO Capsule, or MACRO Vault.

ii. The selected MACRO technology shall be applied so as to completely surround the waste, i.e., the coating or jacket shall be continuous and unbroken.

iii. The MACRO Form, MACRO Capsule, or MACRO Vault shall be created to minimize interior voids or air pockets.

iv. The encapsulating material shall have long-term integrity such that potential leaching media within a hazardous waste cell would not cause the encapsulating material to deteriorate.

v. Waste shall not protrude through the surface of the MACRO Form, MACRO Capsule, or MACRO Vault.

vi. A macroencapsulated waste shall have the MACRO material present and apparent upon surficial visual inspection at the point of disposal.

vii. For MACRO Forms, non-waste protrusions from hangers or spacers may be present. Such protrusions shall be cut off at the surface of the waste form. Gaps between the encapsulating material and such protrusions are not acceptable.

viii. For MACRO Capsules containing hazardous debris, the MACRO container shall be a continuous and unbroken capsule with a secured lid or endcap. The capsule lid or endcap shall be secured to the capsule body using mechanical, adhesive, or welding methods.

ix. Corrective action is required for any MACRO Form or MACRO Capsule that is found not to be of structural integrity prior to disposal in a lift.

x. For LDPE extrusion as the MACRO process, a minimum exterior-surface coating thickness of 1-inch for waste forms up to 30 gallons (4 ft^3) and 2-inches for larger volume MACRO Forms is required, unless a demonstration is made to and approved by the Executive Secretary for an alternate minimum thickness based on waste type.

d. The Permittee may manage a waste as meeting MACRO when the waste does not meet the acceptance criteria above provided that:

i. the waste has a signed LDR certification for MACRO, and

ii. the Executive Secretary provides approval for management of such waste as meeting the MACRO requirements.

4. VERIFICATION REQUIREMENT FOR MACROENCAPSULATED WASTES FROM OFF-SITE SOURCES.

a. Prior to receiving a shipment of macroencapsulated waste, the Permittee shall perform an assessment on the waste to ensure that it meets the criteria in this plan. Drawings, photographs, or both shall be included as illustrations in waste profiles for such waste. When shipments of such waste arrive on site, the Permittee shall ensure that the waste profile information is comparable to the incoming waste. This is completed by the verifying the integrity of the macroencapsulated waste and documenting verification in the Operating Record.

b. The Permittee shall ensure that a land-disposal restriction ("LDR") certification stating that the waste meets the requirements for MACRO accompanies off-site shipments of macroencapsulated waste. If a certification is not present with a shipment, then that discrepancy shall be reconciled in accordance with Attachment II-1, *Waste Analysis Plan*.

c. For MACRO Capsules containing hazardous debris, the Permittee shall ensure that a certification of compatibility between the waste and the MACRO media accompanies the off-site shipment. If a certification is not present with a shipment, then that discrepancy shall be reconciled as required in accordance with Attachment II-1, *Waste Analysis Plan*.

d. For MACRO Capsules containing hazardous debris, the Permittee shall meet the applicable requirements of Attachment II-1, *Waste Analysis Plan*.

e. Prior to disposing an off-site waste as a macroencapsulated waste, the Permittee shall ensure that the waste meets the definition of MACRO and the acceptance criteria as outlined in this Attachment.

f. MACRO Vaults shall not be accepted from off-site sources.

5. WASTE MANAGEMENT FOR MACRO OPERATIONS.

The following requirements apply to MACRO operations:

a. General MACRO Requirements.

i. For wastes that do not meet their applicable treatment standards, MACRO shall only be performed on either hazardous debris or waste in the D008 radioactive lead solids subcategory as defined in UAC R315-13-1.

ii. The Permittee may macroencapsulate wastes that already meet all of their applicable treatment standards, but are not hazardous debris or in the D008 radioactive lead solids subcategory.

iii. For wastes that are in the D008 radioactive lead solids subcategory, LDPE extrusion technology may be utilized to meet applicable extract-concentration-based standards (i.e., TCLP-based treatment standards) as part of a MACRO process, provided that the following requirements are met:

A. Wastes with non-extract-concentration-based treatment standards (e.g., organic constituents with a total-concentration-based treatment standard) that are not met prior to MACRO shall not be macroencapsulated.

B. The full-scale performance demonstration for such waste shall include an analytical verification to show that the specified MACRO process also meets the concentration-based treatment standards. Operational parameters applicable to meeting the concentration-based treatment standards shall be specified prior to commercial treatment of a waste using MACRO technology. The Permittee shall achieve the operational parameters for meeting those treatment standards during commercial MACRO treatment.

C. During the MACRO process, the waste and LDPE shall be mixed to ensure that all waste surfaces are in intimate contact with the LDPE and that interior voids do not exist in the waste form.

D. When disposed in a lift, the final waste form shall meet the criteria for MACRO outlined in Section 5.c of this Attachment, following any required corrective action.

E. Post-treatment analytical testing shall be performed to verify that the applicable concentration-based treatment standards have been met. This is achieved by visual inspection.

iv. MACRO shall only be performed on materials that do not require additional treatment prior to disposal.

v. MACRO operations at the Permittee's facility shall involve the following approved technologies. MACRO shall be performed to meet the performance specifications outlined in the acceptance criteria in Section 3 of this Attachment. The following MACRO technologies are approved:

A. For hazardous debris and/or radioactive lead solids: Low density polyethylene (LDPE) encapsulation using an extruder.

B. For hazardous debris: Placing wastes in an approved container, filling the container to minimize void spaces, and permanently sealing the container to create a MACRO Capsule.

C. For hazardous debris and/or radioactive lead solids: Encapsulation in a MACRO Vault in accordance with the applicable requirements of this Attachment.

D. (Reserved for other MACRO technologies to be approved by the Executive Secretary. The Permittee shall modify the Permit before proceeding with such technologies.)

vi. Prior to acceptance of a MACRO Capsule technology, the Permittee shall compile documentation verifying the integrity, strength, and compatibility of the Capsule material. This information shall also be retained in the Operating Record. Specific performance criteria (or equivalent) that shall be met include:

A. Structural integrity. The MACRO Capsules shall be rated by the manufacturer as to the maximum weight capacity. The total weight of the MACRO Capsule at disposal shall be documented not to exceed this weight rating.

B. Chemical resistance. The MACRO Capsule shall be documented to resist changes in weight, volume, or mechanical properties under conditions of chemical contact. Testing procedures and performance standards shall be comparable to those required for HDPE liners in landfills (i.e., ASTM D543 or National Sanitation Foundation criteria).

C. Waste Compatibility. The MACRO Capsule shall be rated by the manufacturer as to materials and material concentrations that are incompatible with the capsule. Waste placed in the MACRO

Capsule shall not contain concentrations of any incompatible materials sufficient to compromise the integrity of the MACRO Capsule.

vii. LDPE MACRO and MACRO Capsule operations shall take place within the Mixed Waste Storage Building, the Mixed Waste Operations Building or the Mixed Waste Treatment Building. Loading and lid securing operations for MACRO Capsules may also take place on permitted storage pads or holding areas. In the case of loading operations on outdoor permitted storage pads or holding areas, the waste to be encapsulated within MACRO Capsules shall be contained within a closed container such as compacted debris in an 85-gallon overpack drum. Bulk waste shall not be loaded into MACRO Capsules on outdoor storage pads or holding areas.

viii. Prior to proceeding with MACRO of different types of debris or different sizes or shapes of lead such as sheets, bricks, and shot, the Permittee shall conduct a full-scale performance demonstration for internal quality assurance purposes. The demonstration shall show that the Permittee can successfully macroencapsulate that type of waste to meet the acceptance criteria in this plan.

ix. The Permittee shall evaluate and document that each waste stream to be encapsulated will not react with the LDPE. The Permittee shall not subject wastes to MACRO treatment that are incompatible with LDPE.

b. MACRO Operating Requirements

i. Container Management and Preparation for MACRO Operation:

A. Containers shall be used as the waste management units in which MACRO operations take place, unless otherwise specified in this plan.

B. The Permittee shall prevent ice crystals or moisture from being introduced into the LDPE MACRO Form process with the waste or the LDPE. A visual check for ice crystals and moisture shall be performed on the waste and LDPE prior to use in the LDPE MACRO Form process. This check shall be noted in the operating record.

C. For LDPE MACRO, molds shall be used that can withstand the heat of the process without deforming, without contaminating the LDPE, and that provide a rigid enough form to allow intact curing. Molds may be reused or disposed with the MACRO Form.

D. For LDPE MACRO, during the encapsulation process and curing time, the waste shall be secured to attain the specified minimum distance from the exterior of the waste form as specified based on results of the full-scale performance demonstration. Internal devices may be used to secure the waste in place during the MACRO process. Internal devices shall become part of the MACRO form during the MACRO process. Internal devices may be used in the MACRO process, provided that the device does not contaminate the LDPE and that the device permits intimate contact of the LDPE with the waste.

E. When waste is being transferred from a container to be macroencapsulated by LDPE MACRO or MACRO Capsule, the entire transfer shall occur within the Mixed Waste Storage Building, the Mixed Waste Operations Building, or the Mixed Waste Treatment Building. Loading operations for MACRO Capsules may also take place on permitted storage pads or holding areas. In the case of loading operations on outdoor permitted storage pads or holding areas, the waste to be encapsulated within MACRO Capsules shall be contained within a closed container such as compacted debris in an 85-gallon overpack drum. Bulk waste shall not be loaded into MACRO Capsules on outdoor storage pads or holding areas.

F. Only one waste stream is allowed at a time in a container or macro mold before, during, and after MACRO.

G. Size Reduction for MACRO Operations. Where size reduction is necessary for waste that is to be macroencapsulated, the size reduction shall be accomplished in one of the following ways:

(1) Cutting, performed within secondary containment.

(2) Wastes may be shredded or separated in the Mixed Waste Treatment Building or the Mixed Waste Operations Building in preparation for MACRO and in accordance with the applicable provisions of this permit.

(3) Wastes may be compacted using a drum crusher in the Mixed Waste Operations Building in preparation for MACRO and in accordance with the applicable provisions of this permit.

H. Communication Requirement. Prior to macroencapsulating each

waste stream, the foreman or supervisor for the MACRO operation shall confer with those who will be involved with that MACRO to ensure that MACRO personnel have an understanding of the operational requirements and precautions. This pre-operational briefing shall be documented in the Operating Record.

I. Protective Liners for LDPE MACRO. After MACRO, a protective liner consisting of HDPE liner material with a minimum nominal thickness of 80 mils may be used as an alternative to a container associated with the following MACRO Form management activities: inspections, spot welding, spot heating, or removal from molds. An operator shall always be present when MACRO Forms are on the protective liner. These activities shall not be performed outdoors using such protective liners.

J. LDPE MACRO Forms shall be stored and transported in accordance with Attachment III-1, *Container Management Plan.*

K. MACRO Capsules shall be stored and transported in accordance with Attachment III-1, *Container Management Plan*.

ii. LDPE Macroencapsulation:

A. A minimum of two people shall be present when the equipment is extruding.

B. If visible moisture and/or ice crystals are noticed on the waste to be encapsulated, that waste shall not be encapsulated until that waste can be dried or dry waste can be found, substituted and used.

C. If visible moisture and/or ice crystals are noticed on the LDPE to be melted, that LDPE shall not be used and the process shall cease until that LDPE can be dried or dry LDPE can be found, substituted and used.

D. No cold jointing shall be permitted. However, spot welding or spot heating for accomplishing MACRO or as outlined in the MACRO Operation Contingencies is allowed.

E. If entrained gas or air bubbles are apparent in the melt or the appearance of the extrudate is foamy or rough, MACRO shall cease until the cause is found and remedied. The extruder shall be purged until the condition is remedied.

F. For MACRO Forms, curing time shall be specified prior to

MACRO and met during MACRO for each mold size used. Established curing times shall be based upon MACRO experience or results of the full-scale performance demonstrations for internal quality assurance purposes.

G. When a MACRO effort is unsuccessful in meeting the acceptance criteria in this plan, the requirements of MACRO Operation Contingencies and Corrective Action Requirements in Section 5.c.v.A of this plan shall be followed.

iii. MACRO Capsules

A. A minimum of two people shall be present when loading and securing lids to MACRO Capsules.

B. The manufacturer's maximum weight rating for the MACRO Capsule shall be documented in the Operating Record. Each MACRO Capsule shall be weighed after the lid is secured to ensure that this weight rating is not exceeded. Loaded weight shall be documented in the Operating Record.

C. Waste may be loaded into the MACRO Capsule loose or in the shipping container with the lid removed.

D. Following waste loading, voids that remain within the MACRO Capsule shall be filled with flowable material. Acceptable fill materials include but are not limited to CLSM, molten LDPE, and dry sand. The fill material used and inspection that voids are filled shall be documented in the Operating Record.

E. The capsule lid or endcap shall be secured to the capsule body by mechanical, adhesive, or welding methods.

iv. MACRO Vaults

A. Each MACRO Vault design shall be reviewed and approved by the Executive Secretary in writing prior to construction. The following documentation shall be provided to the Executive Secretary with each request to construct a MACRO Vault:

(1) Drawings of the proposed MACRO Vault detailing basic dimensions and construction materials.
(2) Description of the waste(s) to be placed in the MACRO Vault. More than one waste stream may be disposed in a single MACRO Vault if the wastes are compatible with

each other and with the MACRO Vault and surface coating materials.

(3) Description of the material and process to be used to fill any voids within the waste and between the waste and the walls of the MACRO Vault.

(4) Calculations demonstrating that the MACRO Vault will have the structural strength to contain the waste(s) and fill material and that the completed MACRO Vault will not compromise the bearing capacity of the Mixed Waste Landfill Cell.

(5) Identification, as applicable, of the specific surface coating materials and jacket of inert inorganic materials to be used as the macroencapsulating agent(s). Include MSDS and discuss any special handling requirements or hazardous materials associated with the materials to be used. A MACRO Vault may incorporate redundant macroencapsulting agents such as a jacket of concrete backfill coated with a polymeric surface coating material.

(6) A description of MACRO Vault construction, coating, waste placement, void filling, sealing, inspection criteria, and documentation procedures.

B. A minimum of two people shall be present when loading waste into each MACRO Vault.

C. Any precipitation that may accumulate in the MACRO Vault shall be removed prior to waste or backfill placement.

D. Waste may be loaded into the MACRO Vault loose or in a container.

E. Care shall be taken to ensure that waste to be placed in the MACRO Vault does not contact waste emplaced in the Mixed Waste Landfill Cell.

F. The MACRO Vault shall be protected against precipitation contacting the waste until void filling is complete.

G. Voids within the MACRO Vault shall be filled in accordance with the approved submittal to DSHW.

H. Voids within the MACRO Vault shall be filled by the end of the work day that waste is first placed in the MACRO Vault.

(1) If void filling has not yet begun, the waste shall be

removed from the MACRO Vault and placed into storage.

(2) If void filling has begun, but the Permittee is not able to complete void filling on time, the Executive Secretary shall be notified and the MACRO Vault shall be protected against precipitation contacting the waste.

I. A visual inspection that voids are filled shall be performed and documented in the Operating Record.

J. The MACRO Vault shall be sealed in accordance with the approved submittal to DSHW to complete isolation of the waste from exposure to potential leaching media. Sealing shall be completed as soon as practical after the backfill has cured.

K. An approved MACRO Vault design may be used for multiple MACRO Vaults, provided that the waste to be encapsulated fits within the chemical, size, and weight restrictions of the approved design.

v. Recordkeeping.

A. For MACRO operations, the following information shall be kept in the operating record:

(1) Generator Number
(2) Waste Stream Number
(3) date and time of MACRO
(4) quantities of waste encapsulated
(5) operators initials
(6) method of MACRO; i.e., LDPE MACRO, MACRO Capsule, or MACRO Vault

B. The Permittee shall place daily work sheets, inspections, operational parameters for MACRO used to meet concentration-based treatment standards, results of analytical verification of applicable concentration-based treatment standards, and related documents for each MACRO waste stream in its operating record. MACRO records shall be maintained in the operating record for at least five years from the date of treatment.

C. Macroencapsulated waste shall be tracked in the operating record in accordance with Attachment III-2, *Waste Identification and Tracking Plan*.

D. A certification of treatment shall be signed for wastes that are

macroencapsulated in accordance with UAC R315-13-1.

c. Management Requirements for Disposal of macroencapsulated waste

i. MACRO Forms and MACRO Capsules shall be placed in the Mixed Waste Landfill Cell only after being approved for disposal.

ii. MACRO Forms and MACRO Capsules shall be disposed in such a manner as to not exceed the bearing capacity of the cell design under load. The Permittee shall document verification in the Operating Record.

iii. MACRO Forms shall not be stored or disposed in a manner that exposes them to a potential sunlight source for more than 90 days.

iv. MACRO Forms and MACRO Capsules shall not be driven on by heavy equipment before placement in an approved lift.

A. If this occurs to LDPE MACRO Forms, the Permittee shall follow the corrective action requirements outlined in 5.c.v.A through 5.c.v.D., below.

B. If this occurs to MACRO Capsules, an inspection of the entire capsule for cracks or other deformities shall be performed immediately. If cracks or other deformities are found, the Permittee shall follow the corrective action procedure for repairs of MACRO Capsules in Section 5.d.ii.D. of this Attachment.

v. If any person authorized to enter the Mixed Waste Facility notices a LDPE MACRO Form in the Mixed Waste Landfill Cell that does not meet the acceptance criteria in this plan, the following requirements apply:

A. MACRO Forms shall be containerized, labeled and dated on the day of discovery and, within seven days of containerization, shall be made subject to container management requirements.

B. Such MACRO Forms shall be repaired as appropriate to meet the acceptance criteria in this plan before subsequent disposal.

C. Additional time to containerize the waste and/or resume container management of the waste is allowed if verbal or written approval is obtained from the Executive Secretary.

D. Should it prove impractical or a possible hazard to human health or the environment to remove the MACRO Form the Permittee may, upon notification of the Executive Secretary, repair the form

within the Mixed Waste Landfill Cell.

E. For MACRO Forms that have been driven on by heavy equipment, the Permittee shall:

(1) Remove the MACRO Form from the Mixed Waste Landfill Cell;
(2) Visually inspect all surfaces of the MACRO Form to determine the extent of damage, if any; and
(3) If damaged, repair using spot welding or repeat MACRO to ensure that the acceptance criteria are met.

vi. If any person authorized to enter the Mixed Waste Facility notices a MACRO Capsule in the Mixed Waste Landfill Cell that does not meet the acceptance criteria in this plan, the following requirements apply:

A. The damaged MACRO Capsule shall be removed from the Mixed Waste Landfill Cell, labeled, dated, and placed in storage within 24 hours of discovery.

B. Should it prove impractical or a possible hazard to human health or the environment to remove the MACRO Capsule the Permittee may, upon notification of the Executive Secretary, repair the capsule within the Mixed Waste Landfill Cell.

C. The corrective action requirements listed in Section 5.d.ii.D. of this Attachment shall be implemented.

d. Quality Control Requirements for macroencapsulated waste

i. Post-MACRO Inspection.

A. MACRO Forms and MACRO Capsules shall meet the acceptance criteria specified in this plan before the waste shall be placed in the Mixed Waste Landfill Cell for disposal.

B. There shall be an inspection on 100% of cured LDPE MACRO and MACRO Capsules. The Permittee shall document the results of this inspection in an acceptance/rejection log.

C. The following information shall be kept in the operating record:

(1) date of inspection,
(2) Generator Number,
(3) Waste Stream Number,

(4) type of inspection, (primary or after corrective actions)
(5) for LDPE MACRO, polymer used,
(6) for LDPE MACRO, secured minimum LDPE thickness during MACRO,
(7) description, quantity, size of surficial defects,
(8) inspector signature,
(9) pass/fail result,
(10) specified cure times and whether cure times were met,
(11) corrective action taken.

D. MACRO Capsules shall be considered unacceptable for disposal if any surficial defect exceeds half the wall thickness of the MACRO Capsule. MACRO Capsules shall also be considered unacceptable for disposal if there is evidence of compromised container integrity, such as bulging capsule walls or lid. *Note: A passive air pressure release valve or vent is not considered a surficial defect requiring repair.*

E. Corrective action or contingency measures shall be taken for each MACRO Form or MACRO Capsule that is found to be unsatisfactory by the Permittee or in any way does not meet the acceptance criteria in this plan.

ii. MACRO Operation Contingencies and Corrective Action Requirements. Should incomplete or unsatisfactory MACRO occur, the Supervisor shall determine that the object shall be repaired. For purposes of this plan, clipping and spot heating activities associated with standoff removal are not considered a corrective action or repair. The following are requirements for MACRO operational contingencies:

A. MACRO Repairs. Unless otherwise specified in this plan, repairs of MACRO Forms shall be accomplished using spot welding, spot heating or repeat MACRO.

B. Repair Verification. For LDPE MACRO, following curing, the integrity of each repair shall be verified by visual inspection.

C. Removal of LDPE. For LDPE MACRO, all or part of a MACRO Form's LDPE may be removed as part of a repair. LDPE removal shall be performed so that containment is provided by a container or tank.

D. MACRO Vault. Failed LDPE MACRO may be encapsulated in a MACRO Vault.

E. Repairs of MACRO Capsules. The following options are available for damaged MACRO Capsules:

(1) Damaged MACRO Capsules may be wholly encapsulated in another MACRO Capsule, LDPE MACRO, or MACRO Vault in accordance with the requirements of this Attachment.

(2) Alternatively, the MACRO Capsule may be opened and the contents treated to meet land disposal restrictions, such as by macroencapsulation in another MACRO Capsule or LDPE MACRO. Treatment shall be conducted in accordance with applicable sections of this permit. After it is emptied, the capsule shall be managed as an empty container in accordance with Attachment III-1, *Container Management Plan* and may be decontaminated for release or disposed in accordance with Module V, *Disposal in Landfills*.

iii. Operation contingencies, corrective actions and repairs shall be documented in the Operating Record.

END OF ATTACHMENT II-1-5